§ 98.58 Definitions.

All terms used in this subpart have the same meaning given in the Clean Air Act and subpart A of this part.

Subpart F—Aluminum Production

§ 98.60 Definition of the source category.

(a) A primary aluminum production facility manufactures primary aluminum using the Hall-Héroult manufacturing process. The primary aluminum manufacturing process comprises the following operations:

(1) Electrolysis in prebake and Søderberg cells.

(2) Anode baking for prebake cells.

(b) This source category does not include experimental cells or research and development process units.

§ 98.61 Reporting threshold.

You must report GHG emissions under this subpart if your facility contains an aluminum production process and the facility meets the requirements of either § 98.2(a)(1) or (a)(2).

§ 98.62 GHGs to report.

You must report:

(a) Perfluoromethane (CF_4), and perfluoroethane (C_2F_6) emissions from anode effects in all prebake and Søderberg electrolysis cells.

(b) CO_2 emissions from anode consumption during electrolysis in all prebake and Søderberg electrolysis cells.

(c) CO_2 emissions from on-site anode baking.

(d) You must report under subpart C of this part (General Stationary Fuel Combustion Sources) the emissions of CO_2, N_2O, and CH_4 emissions from each stationary fuel combustion unit by following the requirements of subpart C.

[74 FR 56374, Oct. 30, 2009, as amended at 75 FR 79155, Dec. 17, 2010]

§ 98.63 Calculating GHG emissions.

(a) The annual value of each PFC compound (CF_4, C_2F_6) shall be estimated from the sum of monthly values using Equation F–1 of this section:

$$E_{PFC} = \sum_{m=1}^{m=12} E_m \qquad \text{(Eq. F-1)}$$

Where:

E_{PFC} = Annual emissions of each PFC compound from aluminum production (metric tons PFC).

E_m = Emissions of the individual PFC compound from aluminum production for the month ''m'' (metric tons PFC).

(b) Use Equation F–2 of this section to estimate CF_4 emissions from anode effect duration or Equation F–3 of this section to estimate CF_4 emissions from overvoltage, and use Equation F–4 of this section to estimate C_2F_6 emissions from anode effects from each prebake and Søderberg electrolysis cell.

$$E_{CF4} = S_{CF4} \times AEM \times MP \times 0.001 \qquad \text{(Eq. F-2)}$$

Where:

E_{CF4} = Monthly CF_4 emissions from aluminum production (metric tons CF_4).

S_{CF4} = The slope coefficient (($kg\ CF_4$/metric ton Al)/(AE-Mins/cell-day)).

AEM = The anode effect minutes per cell-day (AE-Mins/cell-day).

MP = Metal production (metric tons Al), where AEM and MP are calculated monthly.

$$E_{CF4} = EF_{CF4} \times MP \times 0.001 \qquad \text{(Eq. F-3)}$$

Where:

E_{CF4} = Monthly CF_4 emissions from aluminum production (metric tons CF_4).

EF_{CF4} = The overvoltage emission factor (kg CF_4/metric ton Al).

MP = Metal production (metric tons Al), where MP is calculated monthly.

$$E_{C2F6} = E_{CF4} \times F_{C2F6/CF4} \times 0.001 \quad \text{(Eq. F-4)}$$

Where:

E_{C2F6} = Monthly C_2F_6 emissions from aluminum production (metric tons C_2F_6).
E_{CF4} = CF_4 emissions from aluminum production (kg CF_4).
$F_{C2F6/CF4}$ = The weight fraction of C_2F_6/CF_4 (kg C_2F_6/kg CF_4).
0.001 = Conversion factor from kg to metric tons, where E_{CF4} is calculated monthly.

(c) You must calculate and report the annual process CO_2 emissions from anode consumption during electrolysis and anode baking of prebake cells using either the procedures in paragraph (d) of this section, the procedures in paragraphs (e) and (f) of this section, or the procedures in paragraph (g) of this section.

(d) Calculate and report under this subpart the process CO_2 emissions by operating and maintaining CEMS according to the Tier 4 Calculation Methodology in §98.33(a)(4) and all associated requirements for Tier 4 in subpart C of this part (General Stationary Fuel Combustion Sources).

(e) Use the following procedures to calculate CO_2 emissions from anode consumption during electrolysis:

(1) For Prebake cells: you must calculate CO_2 emissions from anode consumption using Equation F–5 of this section:

$$E_{CO2} = NAC \times MP \times \left([100 - S_a - Ash_a]/100 \right) \times (44/12) \quad \text{(Eq. F-5)}$$

Where:

E_{CO2} = Annual CO_2 emissions from prebaked anode consumption (metric tons CO_2).
NAC = Net annual prebaked anode consumption per metric ton Al (metric tons C/metric tons Al).
MP = Annual metal production (metric tons Al).

S_a = Sulfur content in baked anode (percent weight).
Ash_a = Ash content in baked anode (percent weight).
44/12 = Ratio of molecular weights, CO_2 to carbon.

(2) For Søderberg cells you must calculate CO_2 emissions using Equation F–6 of this section:

$$E_{CO2} = (PC \times MP - [CSM \times MP]/1000 - BC/100 \times PC \times$$
$$MP \times [S_p + Ash_p + H_p]/100 - [100 - BC]/100 \times PC \times MP \times \quad \text{(Eq. F-6)}$$
$$[S_c + Ash_c]/100 - MP \times CD) \times (44/12)$$

Where:

E_{CO2} = Annual CO_2 emissions from paste consumption (metric ton CO_2).
PC = Annual paste consumption (metric ton/metric ton Al).
MP = Annual metal production (metric ton Al).
CSM = Annual emissions of cyclohexane soluble matter (kg/metric ton Al).
BC = Binder content of paste (percent weight).
S_p = Sulfur content of pitch (percent weight).
Ash_p = Ash content of pitch (percent weight).

H_p = Hydrogen content of pitch (percent weight).
S_c = Sulfur content in calcined coke (percent weight).
Ash_c = Ash content in calcined coke (percent weight).
CD = Carbon in skimmed dust from Søderberg cells (metric ton C/metric ton Al).
44/12 = Ratio of molecular weights, CO_2 to carbon.

(f) Use the following procedures to calculate CO_2 emissions from anode baking of prebake cells:

$$E_{CO2PV} = \left(GA - H_w - BA - WT\right) \times (44/12) \qquad \text{(Eq. F-7)}$$

Where:

E_{CO2PV} = Annual CO_2 emissions from pitch volatiles combustion (metric tons CO_2).
GA = Initial weight of green anodes (metric tons).
H_w = Annual hydrogen content in green anodes (metric tons).
BA = Annual baked anode production (metric tons).

(1) Use Equation F–7 of this section to calculate emissions from pitch volatiles combustion.

WT = Annual waste tar collected (metric tons).
44/12 = Ratio of molecular weights, CO_2 to carbon.

(2) Use Equation F–8 of this section to calculate emissions from bake furnace packing material.

$$E_{CO2PC} = PCC \times BA \times \left(\left[100 - S_{pc} - Ash_{pc}\right]/100\right) \times (44/12) \qquad \text{(Eq. F-8)}$$

Where:

E_{CO2PC} = Annual CO_2 emissions from bake furnace packing material (metric tons CO_2).
PCC = Annual packing coke consumption (metric tons/metric ton baked anode).
BA = Annual baked anode production (metric tons).
S_{pc} = Sulfur content in packing coke (percent weight).
Ash_{pc} = Ash content in packing coke (percent weight).
44/12 = Ratio of molecular weights, CO_2 to carbon.

(g) If process CO_2 emissions from anode consumption during electrolysis or anode baking of prebake cells are vented through the same stack as any combustion unit or process equipment that reports CO_2 emissions using a CEMS that complies with the Tier 4 Calculation Methodology in subpart C of this part (General Stationary Fuel Combustion Sources), then the calculation methodology in paragraphs (d) and (e) of this section shall not be used to calculate those process emissions. The owner or operation shall report under this subpart the combined stack emissions according to the Tier 4 Calculation Methodology in §98.33(a)(4) and all associated requirements for Tier 4 in

subpart C of this part (General Stationary Fuel Combustion Sources).

[74 FR 56374, Oct. 30, 2009, as amended at 75 FR 79155, Dec. 17, 2010]

§ 98.64 Monitoring and QA/QC requirements.

(a) Effective December 31, 2010 for smelters with no prior measurement or effective December 31, 2012, for facilities with historic measurements, the smelter-specific slope coefficients, overvoltage emission factors, and weight fractions used in Equations F–2, F–3, and F–4 of this subpart must be measured in accordance with the recommendations of the EPA/IAI Protocol for Measurement of Tetrafluoromethane (CF_4) and Hexafluoroethane (C_2F_6) Emissions from Primary Aluminum Production (2008) (incorporated by reference, see §98.7), except the minimum frequency of measurement shall be every 10 years unless a change occurs in the control algorithm that affects the mix of types of anode effects or the nature of the anode effect termination routine.Facilities which operate at less than 0.2 anode effect minutes per cell day or operate with less than 1.4mV anode effect overvoltage can use either smelter-specific slope coefficients or